1: Petrullo E-3 (1933-34) 1939 S819 Yaruro S519

stop to talk, rest, and later sleep. Twenty-four hours of Yaruro life have gone by. The stomach must be considered again.

THE LLANOS

The country of the Yaruros is a low plain lying south and east of the Venezuelan Andean mountain spur between the fifth and sixth degree of North Parallel. On the east it is flanked by the Orinoco, with the hills of Guiana beyond the river, and on the south the plain rolls away to Colombia. This vast inland plain is burned by a tropical sun the year round and nowhere is there a degree of elevation to relieve one from the intense heat. Fortunately there is no barrier to the trade winds which often blow too hard for human comfort but which, nevertheless, make life bearable by cooling the body and blowing away insect life. During the dry season this plain is a veritable desert with scant vegetation except along the river banks and by water holes. In the rainy season it becomes a vast inland sea rich in animal and plant life. The temperatures during the day are always high. In the plains of Apure 130° F. have been recorded a few feet from the ground. In the middle of the day animal life is practically at a standstill. Cattle and horses which roam the plains half wild or completely so rest quietly. The cowboy withdraws to the shelter of a grass roof; the traveler retires to the shade of a bush, provided he can find one; but the Yaruro seeks the river banks where the winds are freshest and there is always the branch thrust in the sand to give him some shade. In midafternoon the winds abate somewhat, but rise again as the sun sets. There is another lull just before midnight, but in the early morning the wind blows a gale, driving the well-equipped traveler under his blankets and the Yaruros to the warmth of sand pits. Shelter from the wind means intolerable insect life. One must remain exposed to the ever-blowing wind to find any comfort.

It is said that a geologist prospecting unsuccessfully for oil ended his report with the statement, "The plains of Venezuela, or as they are known, the llanos, are rich—in water." He would have been more accurate had he said that the llanos are rich in winds, in dust and sand, insects, and, in the rainy season, flora and fauna.

The llanos would form a desert were it not for the rivers which, fed by the Andes, flow into the Orinoco. The largest of these are the Apure and the Meta. Between them flow the Capanaparo and the Sinaruco. Fishes are plentiful in these rivers. Along the banks are found an abundance of birds, among which ducks, cranes, and storks predominate. Smaller birds give color and song to the country. Near the Orinoco species of sandpipers crowd the sand bars. Hawks and vultures are a common sight.

133 As one goes inland from the coast and westward through Yaruro territory, the land slowly rises so that the town of San Fernando de Apure is about 100 feet above sea level; Palmarito de Guachara, about 60 miles southwest, is just 145 feet; and the Cinaruco river about 100 miles SSW is about 190-200 feet. From the middle Cinaruco, the site of the writer's field work, to the sea, the average slope is 0.007% or 4 ½ inches/mile, but the slope increases gradually as one goes west till nearly 200 miles to the west, the plains abut on the Andes where, within a space of about 50 miles, the land rises from about 650 feet to over 12,000.

132 The slope of the land is paralleled by a gradual increase in total annual rainfall and length of rainy season, respectively averaging for the region as a whole about 1600 mm (63") annually,[1] and about 5 months of heavy rains with 2-3 transitional months of unsettled weather with considerable rain. The slope and climatic gradations are paralleled, furthermore, by an 134 orderly series of soil and vegetation types. As one moves steadily nearer the mountains, the soils change from muds, as at San Fernando, to muddy and sandy loams at Guachara, to sands and sandy loams in the central Cinaruco, and increasingly to sands and pebbly areas. These micro-ecological [134] differences appear to determine micro-cultural differences among various groups of Yaruro as one goes westwards, for example in the specific content of the cosmology. Space only permits us, here, to deal with the Cinaruco area.

133 The dip of the strata, hence drainage, is from West to East. The slope of the dip is so small, as we have noted, that at the first sizable rains, the flow exceeds the carrying capacity of the stream beds and flooding occurs. Thus, during the rainy season from May through September, [132] during which from 85-90% of the annual rain occurs, there is a constant tendency to flood, while during the driest months from December through March, not more than a total of 3 inches falls, and the rivers and landscape dry up often totally, presenting desert-like conditions. Because the topography of the central Cinaruco area is not level in large areas, and even in the flat parts, is raised above the level of the streams, flooding occurs more because of accumulated rain in low spots where it cannot drain than from overflow from streams. The streams themselves are swollen and in places overflow their banks for short distances before they are enclosed by the higher terrain. The west-east dip of the land an the east-west prevailing winds combine to make surface land forms, such as sand dunes and creeks, called *caños* (Y. *doro*) run east and west also.

133 In the central Cinaruco area, the creeks on the north side of the river are contained in a sort of basin formed by a row of dunes, perhaps as high 137 as 100 feet above the neighboring savanas, almost 300 feet above sea level, running east and west for many miles at a distance of 3-5 miles from the Cinaruco. On the south side of such "ranges" of dunes, a creek like the Totúdoro is likely to be found. On its right bank, sometimes at some [134] distance back from the normal high water mark, it is contained by the edge of the flat, sandy, coarse-grained savana, which is marked by a continuous

1 [for footnote see category 116, p.42 --Analyst]

and then shooting into the still side pools of a stream into which he has driven a post with bait attached. He may also stand in a canoe to shoot. It is reported, though I have not myself seen it, that barbasco (*Jacquinia revoluta* or *mucronulata*) poison is used by some Yaruro.[12] No nets, weirs, traps, sweeps, or artificial fish pools are used.

Given the techniques and tools of the Yaruro, all the subsistence activities described can conveniently be done by one person. Some *must* be done by one person only, since the tools and techniques themselves do not permit two or more persons to operate jointly. As it were, the logic of the tools and techniques concerned demands utilization by single persons.[13] Some of the tools and techniques might conveniently involve two or more persons, e. g. lashing tree trunks together to make a fence or cornering a capybara, but do not definitively *require* more than one person. Activities of all sorts may be done by aggregates of persons, each utilizing his own tools and techniques individually but neither the activity, the tools nor the techniques entail the aggregation of individuals. Thus, from the point of view of human organization, the technology, by itself, entails no managerial functions, no coordination of tasks which must be overseen by someone occupying an appropriately defined status.[14] That is, there are no technologically determined positions of leadership in Yaruro society. Further, the technology as such entails no significant cooperation in work organization, even when this is convenient, and correspondingly, no standard work groups or management functions, as represented in some defined status, for facilitating cooperation are to be expected or to be found. In fact, Yaruro technology and resource distribution are such as to elicit considerable dispersion of activities and actors at any given time of work, and to inhibit the development of rank and the personal acquisition of superordinating prestige.

IV

We may now examine the habitat aspect of the ecological relationship. A clearly marked annual cycle occurs in the Yaruro habitat.[15] However, despite a sharp seasonal change from heavy rains up to 60 inches in one half of the year to almost

[12] Personal communication from Mr. Thomas Rootes who has studied Yaruro linguistics for a number of months, having visited several groups.

[13] Different kinds of tools require different kinds of organization. A simple hand saw can be used by only one person at a time. A logging saw, though it can awkwardly be used by one person, is surely best used by two persons. Certain other saws, e. g. jig saws, make up one of a series of machine processes on a single part of a product, the entire series being the unit of operation which requires a still more complex level of organization. Cf. Leeds, 1960 b.

[14] For the structure of argument which is involved here, see Leeds, 1960 b.

[15] 'Habitat' here refers to all physical objects and conditions of the environment which are relevant to the existence or production of resources as defined by the culture. For the most part, then, 'habitat' refers to those environmental conditions such as humidity, temperature, insolation, rainfall, etc., which affect the food supply, as well as the food and water available for animals and plants and other culturally relevant physical objects. By extension, it refers to daily, seasonal, annual, and long-term variations and cycles in the various relevant factors of the environment, whether climatic, geologic, or biotic, which affect any of these supplies.

132 136 [137] desert-like conditions in the other, temperature, sun, soil, and water-table conditions are such that plants will grow all year round, supplying a steady flow of vegetable foods to the people. The change of the water level in the rivers and in the water-table and the sharp increases and decreases of rain strongly affect the patterns of animal and plant life in the Yaruro environment. Annual cyclical variations in wind, humidity, and temperature are also quite marked. Plants and most especially animals, experience a kind of seasonal pulsation. As the rivers fill during the rainy season, the larger animals, such as the cayman, alligator, manati, and dugong, move upstream to somewhat shallower waters, where their food supply is easier of access. Fish also move upstream and even up small brooks, where this is possible. If the savannas flood, many fish swim out into the savannas where numerous insects and other foods are now to be found. The insects themselves multiply and are distributed farther and farther back from the rivers as the rains progress and the savanna floods widen. Meanwhile, foraging animals move farther from the rivers and ponds, and range over greater distances as the rains and the elevated water-tables foster greater plant food resources. Insects in part follow the animals, in part the vegetation as it wakens to winter life in the interfluves. As the dry season begins to return, the reverse process takes place, and all life concentrates nearer and nearer the permanent waters such as the big rivers and some lakes, or at points where the land surface is near enough the permanent water-table to maintain some vegetation, notably the gallery forests and the woodlots, called *montes* in Spanish. Thus one may ideally describe a summer and a winter 221 organization of the habitat. The incidence of resources varies accordingly, and 132 consequently so do the technological activities and tasks to be done. In the dry season, there is a marked increase of gathering, particularly of roots and seeds which appear to store starches for dry season use in the wet season, whereas fruits appear mainly in the rainy season. Hunting increases in the dry season when animals are more highly concentrated in and near the rivers and tributary brooks and streams. Fishing also increases in the dry season as the waters become shallower, less grass-choked, and no longer laden with muds from upstream erosion which makes it impossible to see the fish. Garden production appears to decrease in summer as the dry season precludes growing some crops, such as pineapples, altogether, and [249] reduces the possibility of growing sugar cane and corn.

221 241 132 Despite this marked seasonality, the habitat conditions of both seasons resemble each other in certain formal respects vital to our argument.[10] First, at any given moment of either season, from the point of view of work organization, the resources are what we may call dispersive. Thus, in mid-rainy season, swiddens are to be found dispersed along the streams and brooks flowing into the rivers and these adits are distributed irregularly over the land within a distance of 4—5 miles of the river. Even low slip-off slopes of the river may be used for growing sugar cane in the wet season, though they are too dry in the dry season. Game, such [249] as tortoise, armadillo, deer, birds, and occasional other animals, are to be found [136] throughout the savannas and about the river banks. Fish are found in most streams and in the rivers including those which have no useful banks for horticulture.

[10] Cf. Leeds, 1961, for further details and maps of the seasonal resource locations.

Gathered resources are found near the streams in marshy places where the moriche palm grows, and to a lesser extent in the savannas.[17] The dry season resources are also distributively located though the pattern is somewhat different. Quanta of production from these resources at any one time are rarely great. The larder, as it were, must be filled from a number of sources at once, even though one crop, particularly bitter manioc, and occasionally sweet manioc and corn, may rise briefly to as much as 50 or 60% of the food supply. Thus the available quanta of resources and their distribution at given moments in time are such as to demand a distributive form of labor organization: workers, as individuals or in very small groups, must go off in different directions at the same time. The obverse of this, of course, is that no sizable or permanent working groups are to be expected and none in fact occur. Further, because a dispersion of the labor force and a constant flux in the constitution of work groups is entailed by the relationships between the technology and the habitat, organized and permanent managerial functions can scarcely occur, and no fixed status with significant managerial powers would be expected. The observed data of leadership among the Yaruro and many other tribes in South America and other parts of the world, such as Melanesia, having fundamentally similar ecologies, corresponds precisely with what one is led to expect logically from the form of the ecology.

The absolute size of work groups achievable in the Yaruro habitat is limited not only by the dispersed locations and temporal harvest patterns of resources, but also by the absolute productivity of the ecology. If one calculates the distribution per land area of those calories potentially convertible to human energy, the ratio of calories per unit of land surface is so low that even at maximum utilization only a very low population density of about 2 persons per square mile would be possible. If concentrated in the center of an effective walking distance for exploiting resources of, say, six miles radius from a village, with a resultant total area of about 110 square miles, there would be about 220 souls. Of these, perhaps 70% (all persons over age 10), at maximum, might constitute the labor force, i. e. 154 adults and older children. The actual conditions are, of course, much more limiting, since the efficiency of the technology is such that it cannot exploit the totality of calories potentially available for conversion to human energy at any one time.[19] The actually harvested calories are considerably less, though I have no estimates as to how much less. Let us estimate half, or enough to support one person per square mile, that is, 110 persons. With a somewhat smaller per cent of the population available for the labor force, say 60% of the 110, the force would have only about 67 persons at most. This appears to be a reasonable number for the Cinaruco Yaruro groups, although due to depopulation from disease and mas-

[17] *Ibid.*, Map I.

[18] *Ibid.*, Map II.

[19] For example, all the fish available in the streams at a given time cannot be caught. More could be caught with an improved technology, such as the use of fish traps, weirs, or fish poisons, which, as we have said, are absent from the technology of the Cinaruco Yaruro. Density of fish, or any other biotic population, can be estimated (cf. Dice, 1952, Ch. IV), and then compared with rates of harvesting. Furthermore, it should be noted that often the totality of an actually harvested resource may not be available. For example, in

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Table II
Habitation Types by Community
and according to the Months of the Year

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No. of the Community	Rainy Season						Dry Season					
	June	July	August	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	March	April	May
1	☆	☆	★	☆	☆							
2	★ ●	★ ●	☆ ●	☆ ●	■	□	□	■	□	□	□	□
3	●	○	○	●	○							
4	☆ ○	☆ ●	☆ ○	★ ●	☆ ○							
5	○	○	○	●	● ■	● ■	■	■	□	□	□	□
6	○	●	○	●	● ▲	● ▲	▲	▲	△	△	△	△
7	○	○	○	○	● ■ ▲	● ■ ▲	● ■ ▲	● ■ ▲	□ △	□ △	□ △	□ △
8	☆	★	☆	★	■	□	□	□	□	□	□	□
9	☆	☆	☆	★	■	□	□	□	□	□	□	□
10	☆ D	☆ ◗	☆ D	★ ◗	☆ ◗							
11	☆	☆	☆	★ ■	■	□	□	□	□	□	□	□
12	☆	☆	☆	★	☆	△	△	△	▲	△	△	△
13	☆	☆	☆	★	☆							
14	☆	☆	☆	★	☆							
15	☆	★	☆	☆	☆	◇ △	◇ △	◇ △	◇ △	◆ ▲	◆ ▲	◆ ▲
16	☆	☆	☆	☆	☆	◇ △	◇ △	◇ △	◇ △	◆ ▲	◆ ▲	◇ △
17	☆	☆	☆	★	◆	◇	◇	◇	◇	◇	◆	◇
18	☆	☆	☆	★	☆							
19	☆	☆	☆	★	■	□	□	□	□	□	□	□

5:Le Besnerais--8 E-5 (1947-1950) 1954 SS19 Yaruro SS19

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No. of the Comm.	Rainy Season						Dry Season						
	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	March	April	May
20	☆	☆	☆	☆	★							
21	☆	☆	☆	★	■	□	□	□	□	□	□	□
22	☆	☆	☆	☆	★							
23	○	○	○	●	■	□	□	□	□	□	□	□
24	☆	★	☆	☆	☆							
25	☆	★	☆	☆	☆	☆	☆	☆	☆	☆	★	☆
26	☆	☆	☆	☆	☆	☆ □ △	☆ □ △	☆ □ △	☆ □ △	☆ □ △	★ ■ ▲	☆ □ △
27	☆	☆	☆	☆	☆	△	△	△	△	△	▲	△
28	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	★	☆
29	☆	☆	☆	☆	☆	□ △	□ △	□ △	□ △	□ △	■ ▲	□ △
30	☆ ○	☆ ○	☆ ○	☆ ○	☆ ○	□ △	□ △	□ △	□ △	□ △	■ ▲	□ △

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HABITATION TYPE	I	II, a	II, b	II, a	II, b	III
Type observed occupied (Table I)	★	●	◗	■	◆	▲
Type presumed resulting from the extension of the type observed occupied	☆	○	◗	□	◇	△

Corrections: Put all the white signs of the table and its legend in grey.

Community No. 1 -- Replace all the signs for Type 1 (stars) by the signs for Type II 1 a (circles).

The extension was made in the following manner:

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A type observed during the months of the rainy season (June to September) was extended to all the months of this season and for that which follows it (October), that is, for half of the transition period, rainy season-dry season.

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162 Each community is comprised of ten to 30 individuals
621 including children (average: 17.9), distributed in one or
942 several habitations of which the type varies according to function and the nature of the terrain and the season (1).

[132]
[193]

1. The Venezuelan llanos are huge savannas furrowed with watercourses running west-east and bordered with a corridor of forest, narrow but dense; they have a tropical climate characterized by two seasons: a rainy season, winter (June to September), during which the rivers overflow their beds and flood the savanna, and a dry season, summer (December to April), during which the latter become dry in part, uncovering long sandy shores.

342 The first type (I) is an upright house with a rectangular base (sometimes oval), three to four meters wide by five to seven long and three to four high, without walls and covered with a straw or palm roof with two sloping sides, open or closed at one or two ends and protecting from rain. It is built on the hard ground of high banks that the floods of the rainy season do not reach.

The second type (II) is a small, low hut (a man cannot stand in it) with a round base (II a) or oblong (II b), also without walls and covered with a roof of palms, either hemispherical (II a) or with two sloping sides (II b), protecting from rain; it stands on the soft ground of sand dunes and shores raised above the flood level (II 1), or shores freed by a drop in the water level (II 2).